CLAIMS

1. A surface processing method comprising the steps of:

(a) irradiating a surface of an SOG layer with an electron beam so as to expose at least part of the SOG layer; and

(b) removing all or part of the exposed parts of the SOG layer by etching.

2. A surface processing method employing a laminated body having a sample material; an intermediate layer formed on a surface of the sample material, and an SOG layer formed on a surface of the intermediate layer, the method comprising the steps of:

(a) irradiating the surface of the SOG layer with an electron beam so as to expose at least part of the SOG layer; and

(b) removing all or part of the exposed parts of the SOG layer by etching.

3. The surface processing method of claim 1 or claim 2, wherein an accelerating voltage for the electron beam is changed according to irradiation position of the electron beam.

4. The surface processing method of claim 2, wherein the intermediate layer is made from PMMA or silane coupling agent.

5. The surface processing method of claim 2, further comprising a step of:

(c) after step (b), carrying out etching using an etchant corroding the SOG layer, the intermediate layer, and the sample material, and processing the surface of the sample material and/or the intermediate layer.

6. A surface processing method employing a laminated body having a sample material; an intermediate layer formed on a surface of the sample material, and an SOG layer formed on a surface of the intermediate layer and with a recess or protrusion formed on the surface of the SOG layer, comprising a step of:

(a) carrying out etching using an etchant corroding the SOG layer, the

intermediate layer, and the sample material, and forming an uneven surface on the surface of the sample material and/or the intermediate layer.

7. The surface processing method of claim 5 or claim 6, wherein the etchant is an etchant corroding the intermediate layer and/or the sample material more easily than the SOG layer.

8. The surface processing method as disclosed in any one of claims 5 to 7, wherein the sample material is any of diamond, SiC, quartz, and resin.

9. The surface processing method as disclosed in any one of claims 6 to 8, wherein the etchant is an ion beam or radiated light.

10. The surface processing method as disclosed in any one of claims 6 to 9, wherein the recess or protrusion at the surface of the SOG layer is formed by pushing a mold against the SOG layer.

11. The surface processing method as disclosed in any one of claims 6 to 9, wherein the recess or protrusion at the surface of the SOG layer is formed by a processing method disclosed in any one of claims 1 to 3.

12. The surface processing method as disclosed in any one of claims 1 to 11, wherein the surface formed by the processing method can be used as a mold for use in molding.

13. A method for fixing particulate comprising the steps of:

(a) irradiating a surface of an SOG layer with an electron beam so as to expose at least part of the SOG layer mixed with particulate; and

(b) removing part or all of the exposed part of the SOG layer by etching so as to expose the particulate at the surface of the SOG layer or bring the particulate close to the surface.

14. The particulate fixing method as disclosed in claim 13, wherein the SOG layer is formed on a sample material or on a surface of an intermediate layer formed on the surface of the sample material.

15. The particulate fixing method as disclosed in claim 13 or claim 14,

wherein an accelerating voltage for the electron beam is changed according to irradiation position of the electron beam.

16. The particulate fixing method as disclosed in claim 14, wherein the intermediate layer is made from PMMA or silane coupling agent.

17. The particulate fixing method of any one of claims 13 to 16, wherein the particulate is any of carbon nanotube, diamond powder and metallic microparticles.

18. A molded article wherein forming takes place using a surface processed using the method disclosed in any one of claims 1 to 11.

19. The surface processing method as disclosed in claim 6, wherein aspect ratio of the uneven surface is adjusted after processing of the sample material and/or the intermediate layer by changing the thickness of the intermediate layer.

20. A laminated body comprising: a sample material; an intermediate layer formed on the surface of the sample material; and an SOG layer formed on the surface of the intermediate layer.

21. The laminated body of claim 20, wherein the sample material is any of diamond, SiC, quartz, and resin.

22. The laminated body as disclosed in claim 20 or claim 21, wherein the intermediate layer is PMMA or a silane coupling agent.

23. A laminated body manufacturing method wherein an intermediate layer is formed on a surface of a sample material and an SOG layer is formed on a surface of the intermediate layer.

24. The surface processing method as disclosed in claim 9, wherein the ion beam is an oxygen ion beam.

25. A surface processing method employing a laminated body having a sample material and an SOG layer, with the SOG layer being arranged on one side of the sample material, comprising the steps of:

(a) exposing the sample material by partially eliminating or forming the SOG layer; and

(b) processing the exposed sample material by etching.

26. A surface processing method employing a laminated body having a sample material, an intermediate layer, and an SOG layer, with the intermediate layer being arranged between the sample material and the SOG layer, comprising the steps of:

(a) exposing the sample material or the intermediate layer by partially eliminating or forming the SOG layer; and

(b) processing the exposed sample material or intermediate layer by etching.

27. The surface processing method of claim 25 or claim 26, further comprising a step of:

(c) eliminating remaining SOG layer after step (b).

28. The surface processing method of claim 1 or claim 2, wherein applied voltage in the vicinity of the surface is changed according to irradiation position of the electron beam.

29. The surface processing method as disclosed in claim 1 or claim 2, wherein depth of the portion eliminated by etching is controlled based on electron beam dosage.

30. A surface processing method comprising the steps of:

(a) irradiating a surface of a first SOG layer with an electron beam so as to expose at least part of the first SOG layer;

(b) forming a second SOG layer on a surface of the first SOG layer;

(c) irradiating a surface of the second SOG layer with an electron beam so as to expose at least part of the second SOG layer; and

(d) removing all or part of the exposed portions of the first and second SOG layers by etching.

31. The surface processing method as disclosed in claim 30, wherein the portion of the second SOG layer irradiated with an electron beam is formed at a position overlapping with the portion of the first SOG layer irradiated with an electron beam.

32. The surface processing method as disclosed in claim 30 or claim 31, wherein the width of the portion of the second SOG layer irradiated with an electron beam is narrower than the width of the portion of the first SOG layer irradiated with an electron beam.

33. A surface processing method employing a laminated body having a sample material and an SOG layer, with the SOG layer being arranged on one side of the sample material, comprising the steps of:

(a) forming a recess or protrusion at a surface of the SOG layer by partially eliminating or forming the SOG layer; and

(b) processing the sample material from a surface side of the SOG layer by etching.

34. A surface processing method employing a laminated body having a sample material, an intermediate layer, and an SOG layer, with the intermediate layer being arranged between the sample material and the SOG layer, comprising the steps of:

(a) forming a recess or protrusion at a surface of the SOG layer by partially eliminating or forming the SOG layer; and

(b) processing the intermediate layer or the sample material from a surface side of the SOG layer by etching.

35. A surface processing method, employing a laminated body having a sample material and a mask layer formed on a surface side of this sample material formed with a recess or a protrusion at a surface of the mask layer, comprising a step of:

(a) etching from the side of the mask layer using an etchant corroding the

mask layer and the sample material so as to process the surface of the sample material.

36. The surface processing method as disclosed in any one of claims 1 to 12, 19, 24 to 29, 33, or 34, wherein a silcone rubber layer is used in place of the SOG layer.

37. The surface processing method as disclosed in any one of claims 30 to 32, wherein first and second silcone rubber layers are used in place of the first and second SOG layers.

38. The particulate fixing method as disclosed in any one of claims 13 to 17, wherein a silcone rubber layer is used in place of the SOG layer.

39. Molded matter as disclosed in claim 18, wherein a silcone rubber layer is used in place of the SOG layer.

40. The laminated body as disclosed in any one of claims 20 to 22, wherein a silcone rubber layer is used in place of the SOG layer.

41. A method for manufacturing a laminated body as disclosed in claim 23, wherein a silcone rubber layer is used in place of the SOG layer.

42. A surface refining method, employing a laminated body having a sample material and a mask layer formed on a surface side of the sample material, wherein the surface of the mask layer is irradiated with an electron beam, and at least part of the mask layer is exposed and refined.

43. The surface refining method as disclosed in claim 42, wherein the mask layer is made of SOG.

44. The surface refining method as disclosed in claim 42, wherein the mask layer is made of silicone rubber.

45. The surface refining method as disclosed in any one of claims 42 to 44, wherein the electron beam is irradiated towards the laminated body, and the depth of a refined portion of the mask layer can be controlled by adjusting potential on the laminated body side.

46. The surface refining method as disclosed in any one of claims 42 to 44, wherein the depth of the refined portion of the mask layer can be controlled by regulating the electron beam dosage.

47. The surface refining method as disclosed in any one of claims 42 to 46, wherein an intermediate layer is positioned between the sample material and the mask layer.

48. The surface refining method as disclosed in any one of claims 42 to 47, wherein a further mask layer is laminated onto a surface of the mask layer after refining the mask layer.

49. The surface refining method as disclosed in claim 48, wherein after laminating the further mask layer onto the surface of the mask layer, the surface of the further mask layer is irradiated with an electron beam, and at least part of the further mask layer is exposed and refined.